

Appl. No. : 10/624, 728
Filed : July 21, 2003

REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested. Figure 2 of this application has been replaced with new Figures 2A and 2B, which include features specified in the claims but not shown in the original drawings. The Specification has been amended to reflect the replacement of Figure 2 with new Figures 2A and 2B. Claims 1-17 were pending in this application prior to entry of the abovementioned amendments. Claims 1 and 4-12 have been amended to clarify the invention. No new matter is added by any of these amendments. Claims 2 and 13-17 are herein canceled. Claims 18-25 are new. Accordingly, Claims 1, 3-12 and 18-25 are now pending

Applicant submits that this application, as amended, is in condition for allowance and such action is earnestly requested. Each of the Examiner's reasons for rejection is addressed below.

I. Drawings

The drawing were objected to under 37 CFR 1.83(a) because they did not show the following features recited in the claims: remote plasma applicator, common power source, robot, first plasma applicator, second plasma applicator, radio frequency power source, downstream plasma reactor, in-chamber plasma reactor, and computer. Figure 2 has been replaced with Figures 2A and 2B, which include these features. The new drawings are fully supported by the original application, which incorporates U.S. Patent No. 6,273,956 to Cox ("Cox") by reference in paragraph 3. The systems of Figures 2A and 2B are configured for remote and in situ (or in-chamber) plasma generation, respectively, in accordance with preferred embodiments of the invention.

Figure 15 of Cox shows a radio frequency or other common power source 22, a first plasma applicator 26, a second plasma applicator 28, a switch 24 and a process gas source 20. Col. 8, lines 25-30 and 39-42; col. 10, lines 40-52. Figure 6 of Cox shows a robot 15, which is configured to load and unload wafers from the chambers 30,32. Col. 10, lines 51-52; col. 9, lines 1-30. Figure 7 of Cox shows a computer. Col. 8, lines 59-61.

New Figures 2A and 2B show features substantially as shown in Cox. No new matter is added by these new drawings. With the addition of Figures 2A and 2B, the drawings show all of

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the features of the amended claims. Accordingly, Applicant respectfully requests that this objection be withdrawn.

II. Section 101 Rejections

Claims 1-13 stand rejected under 35 U.S.C. § 101 as claiming the same invention as Claims 1-28 of Cox. Applicant respectfully traverses this rejection.

“A reliable test for double patenting under 35 U.S.C. 101 is whether a claim in the application could be literally infringed without literally infringing a corresponding claim in the patent. *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970). Is there an embodiment of the invention that falls within the scope of one claim, but not the other? If there is such an embodiment, then identical subject matter is not defined by both claims and statutory double patenting would not exist. For example, the invention defined by a claim reciting a compound having a ‘halogen’ substituent is not identical to or substantively the same as a claim reciting the same compound except having a ‘chlorine’ substituent in place of the halogen because ‘halogen’ is broader than ‘chlorine.’” M.P.E.P. § 804 (II)(A).

Amended Claim 1 recites, *inter alia*, a single pump in fluid communication with the two processing chambers and a throttle valve simultaneously downstream of both chambers and upstream of the pump, the throttle valve configured to regulate the pressure in both of the chambers. The amendment to Claim 1 is fully supported by the application, as originally filed, at, for example, paragraph 20 and original Figure 2. In contrast, Cox’s Claim 1 does not recite a pump or a throttle valve. Cox’s Claim 14 recites a process gas pump coupled to a throttle valve for stabilizing the operating pressure of one of the chambers. Cox’s Claim 14 does not recite a throttle valve simultaneously downstream of both chambers and upstream of the pump, wherein the throttle valve is configured to regulate the pressure in both chambers. An apparatus having separate pumps and throttle valves for each chamber, for example, could literally infringe Cox’s Claims 1 or 14 but would not literally infringe amended Claim 1 of the present application. Hence, the scope of the Applicant’s Claim 1 is clearly different than the scope of Cox’s claims. Accordingly, Applicant respectfully requests that the double patenting rejection of Claims 1 and 3-11 be withdrawn.

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Amended Claim 12 recites, *inter alia*, a computer configured to control the pump and the robot to effect pump-down and subsequent process pumping of one of the chambers during simultaneous venting, workpiece removal and workpiece reloading of the other of the chambers, such that said pump-down pumping of one of the chambers and said venting of the other of the chambers begin at substantially the same time. The amendment to Claim 12 is fully supported by Figure 4 and the Specification at, for example, paragraph 26. Cox's Claim 1 recites a computer for repeatedly, synchronously alternately controlling power source application, robot movement and chamber processing. An apparatus in which, for example, pump-down pumping of a first chamber does not begin at substantially the same time as venting of a second chamber could possibly literally infringe Cox's Claim 1 but could not literally infringe Applicant's Claim 12. Hence, Cox's claims are clearly different in scope than Applicant's Claim 12. Accordingly, Applicant respectfully requests that the double patenting rejection of Claim 12 be withdrawn.

III. Section 102 Rejections

Claims 1-12 stand rejected under 35 U.S.C. § 102(f) or (g) as being directed to the same invention as that of Claims 1-28 of Cox. Claim 1, as amended, is not directed to the same invention as that of Cox because Cox does not disclose or claim a *single* pump in fluid communication with two chambers and a throttle valve *simultaneously* downstream of both chambers and upstream of the pump. In contrast, Cox's single pump embodiment (Figures 14 and 15) teaches using separate throttle valves for each processing chamber. Accordingly, Applicant respectfully requests that the rejection of Claim 1 be withdrawn.

Claims 3-11 recite additional features of advantage and utility. Moreover, these claims are allowable because they depend from and therefore include all of the limitations of Claim 1. Cox does not disclose all of the limitations of Claim 1, let alone the unique combinations of limitations of Claims 3-11. Accordingly, Applicant respectfully requests that the rejections of Claims 3-11 also be withdrawn.

Claim 12 recites, *inter alia*, a first processing chamber, a second processing chamber and a pump. Claim 12, as amended, is not directed to the same invention as Cox because Cox does not disclose or claim a computer configured to control the pump and a robot to effect pump-down and subsequent process pumping of one of the chambers during simultaneous venting,

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workpiece removal and workpiece reloading of the other of the chambers, such that said pump-down pumping of one of the chambers and said venting of the other of the chambers begin at substantially the same time. In contrast, as shown in Figure 3 of the present application, Cox begins pump-down of a first chamber during processing of a second chamber. Accordingly, Applicant respectfully requests that the rejection of Claim 12 be withdrawn.

Claims 1, 3, 6, 10 and 11 are rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Patent No. 08127861 to Ishihara Yasumasa ("Yasumasa"). With reference to the abstract and Figure 1 of Yasumasa, the Examiner states that Yasumasa teaches a photoresist ashing system comprising two processing chambers (any two of 3A-C; Figure 1; abstract) configured for alternate operation, and a single dry pump ("DP") in fluid communication with the two chambers, the pump configured to perform both pump-down and process pumping of the two chambers. The Applicant respectfully traverses these rejections.

Claim 1 recites, *inter alia*, a photoresist ashing system comprising two processing chambers and a single pump in fluid communication with the two chambers, the pump configured to perform both pump-down and process pumping of the two chambers. Amended Claim 1 recites, *inter alia*, a **throttle valve** simultaneously downstream of both chambers and upstream of the pump, wherein the throttle valve is configured to regulate the pressure in both of the chambers. Processing in the two chambers is advantageously regulated by a single throttle valve, simplifying the apparatus and reducing the number of components of the system. Amended Claim 1 is allowable over Yasumasa because Yasumasa does not teach or suggest a **throttle valve** simultaneously downstream of two processing chambers and upstream of a pump. Accordingly, Applicant respectfully requests that the rejection of Claim 1 be withdrawn.

Claims 3, 6, 10 and 11 recite additional features of advantage and utility. Moreover, these claims are allowable over Yasumasa because they depend from and therefore include all of the limitations of Claim 1. Yasumasa does not teach all of the limitations of Claim 1, let alone the unique combinations of limitations of Claims 3, 6, 10 and 11. Accordingly, Applicant respectfully requests that the rejections of Claims 3, 6, 10 and 11 also be withdrawn.

Claims 1-12 are rejected under 35 U.S.C. § 102(a,e) as being anticipated by Cox. With reference to Figure 15 of Cox, Cox teaches a dual chamber apparatus consisting of two chambers (30,32), two throttle valves (36,37) each downstream of one of the chambers, and a source of

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vacuum 34 downstream of the throttle valves 36,37. Amended Claim 1 is allowable over Cox because Cox does not teach a throttle valve *simultaneously* downstream of both chambers and upstream of a *single* pump, wherein the throttle valve is configured to regulate the pressure in both of the chambers. Accordingly, the Applicant respectfully requests that the rejection of Claim 1 be withdrawn.

Claims 3-11 recite additional features of advantage and utility. Moreover, these claims are allowable because they depend from and therefore include all of the limitations of Claim 1. Cox does not disclose all of the limitations of Claim 1, let alone the unique combinations of limitations of Claims 3-11. Accordingly, Applicant respectfully requests that the rejections of Claims 3-11 also be withdrawn.

Amended Claim 12 recites, *inter alia*, a computer configured to control the pump and the robot to effect pump-down and subsequent process pumping of one of the chambers during simultaneous venting, workpiece removal and workpiece reloading of the other of the chambers, such that said pump-down pumping of one of the chambers and said venting of the other of the chambers begin at substantially the same time. Amended Claim 12 is allowable over Cox because Cox does not teach or suggest a dual chamber processing system comprising a computer configured to begin pump-down pumping of one chamber and venting of another at substantially the *same time*. In Cox's system, pump-down pumping of one chamber precedes venting of the other. *See Cox, Figure 22.*

The limitations of amended Claim 12 have several advantages over Cox. Cox teaches a dual chamber apparatus configured to operate under "zero overhead" conditions if all chamber/robot overhead processes associated with one chamber begin and finish within the wafer processing time of the other chamber. Col. 9, lines 31-37. However, Applicant has observed that the zero overhead condition in Cox's system is not always achieved because the preparation phase (i.e., venting, unloading, loading and pump-down) associated with one chamber sometimes lasts longer than the simultaneous processing phase associated with the other chamber. Specification, Figure 3 and paragraph 22. Thus, in embodiments involving two pumps, Cox's processing pump will idle until the pump-down pump has finished pumping down one of the chambers. This idle time imposes substantial expenses in operating and maintaining the pumps. Specification, paragraph 23. Even in embodiments involving only a single pump

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(e.g., Cox's Figure 14), the pump is not available during the entirety of each processing phase because it must be diverted to the other chamber for an overlapping pump-down operation, regardless of whether a zero overhead condition exists.

In overcoming these problems, Applicant has moved the pump-down step from the end of the preparation phase of one chamber to the beginning of the processing phase of the other chamber (Figure 4 of the present application), which effects substantial savings in facility expenses and eliminates a number of costly pumping system components, including at least one throttle valve and at least one pump. Specification, paragraph 24. This configuration also allows for process pumping during the entirety of each processing phase. Accordingly, Applicant respectfully requests that the rejection of Claim 12 be withdrawn.

New Claims 18-25 recite additional features of advantage and utility. Moreover, these claims are allowable over Cox because they depend from and therefore include all of the limitations of Claim 12. Cox does not disclose all of the limitations of Claim 12, let alone the unique combinations of limitations of Claims 18-25. Accordingly, Applicant respectfully requests that Claims 18-25 be granted allowance.

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CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. If there is any further hindrance to allowance of the pending claims, the Examiner is invited to contact the undersigned.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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AMENDMENTS TO THE DRAWINGS

Please replace Figure 2 with new Figures 2A and 2B. Replacement drawing sheets for Figures 2A and 2B are enclosed with this Amendment.